



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,366	07/21/2006	Masakazu Hirose	OBA-40858	9931
116 7590 02/03/2011 PEARNE & GORDON LLP 1801 EAST 9TH STREET SUITE 1200 CLEVELAND, OH 44114-3108			EXAMINER HOBAN, MATTHEW E	
			ART UNIT 1734	PAPER NUMBER
			MAIL DATE 02/03/2011	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/597,366

Applicant(s)

HIROSE ET AL.

Examiner

Matthew E. Hoban

Art Unit

1734

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 January 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1.4.5 and 7-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1.4.5 and 7-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-040)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/17/2009 has been entered.

Previous Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 4-5, 7 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taiji in JP2001-181033.

Regarding Claim 1, 4 and 18-20: Taiji teaches compositions of the formula $[Pb_{a1}A_{a2}][(B1B2)_xTi_yZr_z]O_3$, wherein $a1+a2$ is less than 1 but greater than .97; $a2$ can be 0, while $a1$ cannot; $x+y+z=1$; x : .05-.4; y : .1-.5; z : .2-.6. Furthermore, B1 is chosen from a group comprising Mn among other elements, and B2 is chosen from a group comprising Nb among other elements. Therefore, the main component of Taiji's piezoelectric composition represents an overlapping range with the claimed composition. Although the disclosure of B1B2 includes elements other than those claimed, certain combinations of these elements would immediately be deemed appropriate to one of ordinary skill in the art, one of which would be the $Pb(Mn_{1/3}Nb_{2/3})O_3$ composition, which is a perovskite compound having mainly Pb, Zr, Ti, Mn and Nb. The number of appropriate piezoelectric, perovskite compositions that are appropriate under Taiji are therefore limited. Furthermore, the range of compositions of the main component of Taiji overlaps the claimed composition of the main component.

Overlapping ranges have been held to create a prima facie case of obviousness over the prior art. Wherein, the claims have an overlapping set of ranges one of ordinary skill in the art would have been well equipped to choose from the overlapping portion of the ranges and arrive at the invention as claimed.

Taiji also teaches additives in his composition which can be chosen from a wide range and can be added in combination with one another. These additives amount to .001-1 wt% of the total composition weight. Among this group of possible additives is Al_2O_3 . Therefore, the amount of Al_2O_3 added to the composition of Taiji overlaps with the amount added to the instantly claimed piezoelectric ceramic. Overlapping ranges have been held to create a prima facie case of obviousness over the prior art. Wherein, the claims have an overlapping set of ranges one of ordinary skill in the art would have been well equipped to choose from the overlapping portion of the ranges and arrive at the invention as claimed (See Paragraph 7-8).

Regarding Claim 5: Taiji teaches that Al_2O_3 is used as an additive in the composition. It has been shown previously in the prior art that such incorporation necessarily incorporates Al_2O_3 in both the grains and grain boundaries of the polycrystalline sample. See page 652 of Tajima, which is being used in this capacity as an exemplary document. As the composition of Taiji is a PZT based ceramic, the structure and behaviour of Al_2O_3 included in the composition would necessarily be the same.

Regarding Claim 7: As Taiji teaches a composition having the same range of compositions as those of the instant claims, it must necessarily follow that the properties of the composition be the same. It is known that the addition of Al_2O_3 increases the mechanical properties of perovskite structures. This is to be expected. As materials of the same structure and composition cannot have two sets of mutually exclusive properties, these limitations must necessarily be met.

5. Claims 8-17 rejected under 35 U.S.C. 103(a) as being unpatentable over Taiji in JP2001-181033 in view of Xiang in their publication entitled "Microstructure and mechanical properties of small amounts of In_2O_3 reinforced $\text{Pb}(\text{Zr}_x\text{Ti}_{1-x})\text{O}_3$ ceramics".

Regarding Claim 8-10, 15, and 17: Taiji teaches compositions of the formula $[\text{Pb}_{a1}\text{A}_{a2}][(\text{B1B2})_x\text{Ti}_y\text{Zr}_z]\text{O}_3$, wherein $a1+a2$ is less than 1 but greater than .97; $a2$ can be 0, while $a1$ cannot; $x+y+z=1$; x : .05-.4; y : .1-.5; z : .2-.6. Furthermore, B1 is chosen from a group comprising Mn among other elements, and B2 is chosen from a group comprising Nb among other elements. Therefore, the main component of Taiji's piezoelectric composition represents an overlapping range with the claimed composition. Although the disclosure of B1B2 includes elements other than those claimed, certain combinations of these elements would immediately be deemed appropriate to one of ordinary skill in the art, one of which would be the $\text{Pb}(\text{Mn}_{1/3}\text{Nb}_{2/3})\text{O}_3$ composition, which is a perovskite compound having mainly Pb, Zr, Ti, Mn and Nb. The number of appropriate piezoelectric, perovskite compositions that are

appropriate under Taiji are therefore limited. Furthermore, the range of compositions of the main component of Taiji overlaps the claimed composition of the main component. Overlapping ranges have been held to create a prima facie case of obviousness over the prior art. Wherein, the claims have an overlapping set of ranges one of ordinary skill in the art would have been well equipped to choose from the overlapping portion of the ranges and arrive at the invention as claimed.

Taiji is silent as to the use of additives such as indium or gallium oxides.

However, Xiang teaches that the addition of .5-2 wt% of In_2O_3 is useful for increasing the modulus, hardness and toughness of the material while decreasing the amount of crack energy absorbed due to domain switching, while also refining the microstructure significantly. Thereafter, the addition of this oxide offers significant improvements to the piezoelectric and these improvements would thereafter offer motivation to those of ordinary skill in the art to incorporate said oxide. Thus, such a combination of references would be obvious.

Regarding Claim 11-12, 16 and 18: Taiji also teaches additives in his composition which can be chosen from a wide range and can be added in combination with one another. These additives amount to .001-1 wt% of the total composition weight. Among this group of possible additives is Al_2O_3 . Therefore, the amount of Al_2O_3 added to the composition of Taiji overlaps with the amount added to the instantly claimed

piezoelectric ceramic. Overlapping ranges have been held to create a prima facie case of obviousness over the prior art. Wherein, the claims have an overlapping set of ranges one of ordinary skill in the art would have been well equipped to choose from the overlapping portion of the ranges and arrive at the invention as claimed (See Paragraph 7-8).

Regarding Claim 13: Taiji teaches both Al_2O_3 and SiO_2 as additives, wherein the list of additives can be used in combination, but can only be used in an amount from .01-1wt%. the amount of Ta_2O_5 and SiO_2 added to the composition of Taiji overlaps with the amount added to the instantly claimed piezoelectric ceramic. Overlapping ranges have been held to create a prima facie case of obviousness over the prior art. Wherein, the claims have an overlapping set of ranges one of ordinary skill in the art would have been well equipped to choose from the overlapping portion of the ranges and arrive at the invention as claimed (See Paragraph 7-8).

Regarding Claim 14 and 15: Taiji does not test the claimed properties in his disclosure; however, the composition of Taiji would necessarily have these properties as it is of the same composition as that which is claimed. A composition of the same components and morphology cannot have mutually exclusive properties. See MPEP 2112.

Response to Arguments

6. Applicant's arguments filed 12/17/2009 have been fully considered but they are not persuasive. The rejection over Ise in view of Tajima has been withdrawn with the instant claim amendment. Applicant argues that Taiji teaches a large amount of variations in the formula of his teachings. This is not found convincing as one of ordinary skill in the art realizes that there are a finite number of appropriate known combinations within those shown. In terms of the perovskite used several combinations of elements are known in the art to commonly be used for B1B2. Thereafter, the combinations are not as expansive as delineated by applicant. The disclosure of the prior art is interpreted in terms of what it means to one of ordinary skill in the art. Furthermore, the list of additives has known effects upon the final composition. One of ordinary skill in the art would select these additives based on their known effects. Thereafter, simply the number of combinations possible is not proof of the unobviousness of the stated invention. Applicant has combined known additives and perovskite compositions. Such a combination is only unobvious where it can be shown that unexpected results are achieved.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Hoban whose telephone number is (571) 270-3585. The examiner can normally be reached on Monday - Friday from 10 AM to 6:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emily M. Le can be reached on 5712720903. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. Melissa Koslow/
Primary Examiner, Art Unit 1734

/Matthew E Hoban/
Examiner, Art Unit 1734